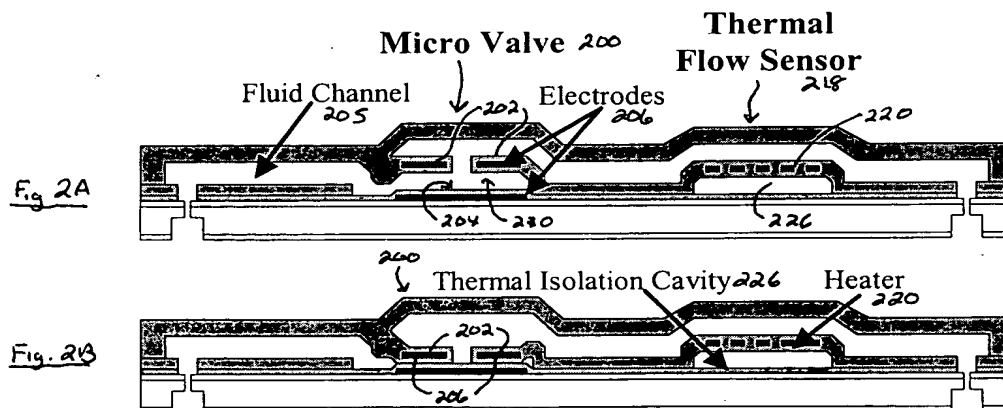
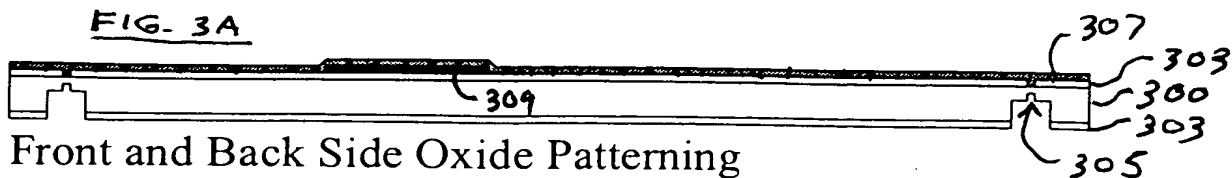


Figure 1. Integrated microfluidic chip mounted on PCB.
 Micro flow controller



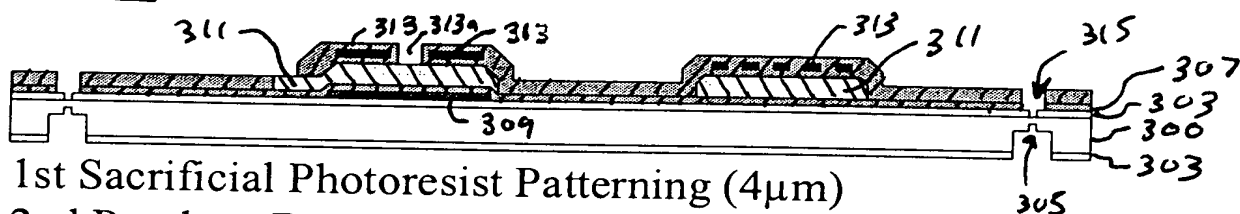
BEST AVAILABLE COPY

FIG. 3A



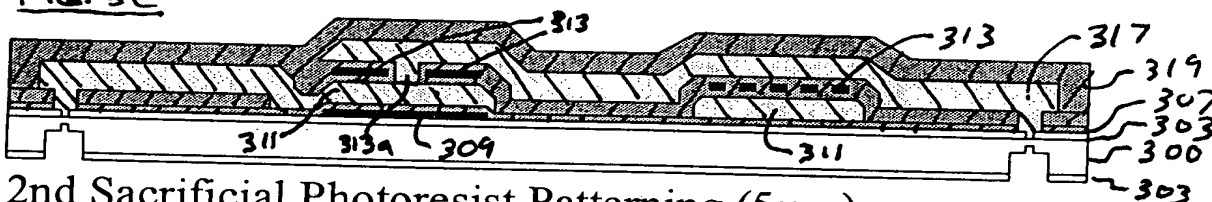
Front and Back Side Oxide Patterning
 Back Side DRIE Etching
 1st Cr/Au Patterning (100Å/3000Å)
 1st Parylene Deposition (1μm)

FIG. 3B



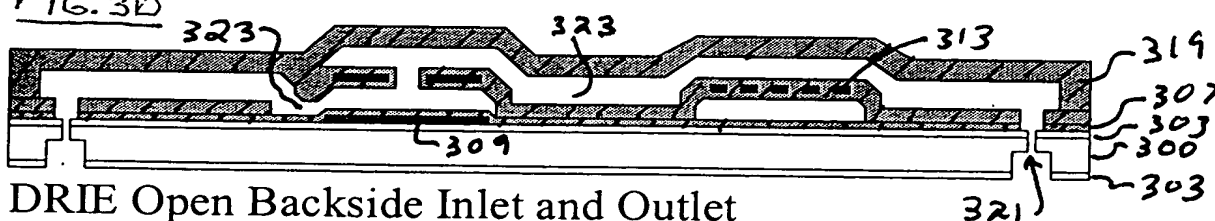
1st Sacrificial Photoresist Patterning (4μm)
 2nd Parylene Deposition and Patterning (1μm)
 2nd Cr/Au Patterning (100Å/1500Å)
 3rd Parylene Deposition and Patterning (1μm)

FIG. 3C



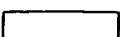
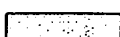



2nd Sacrificial Photoresist Patterning (5μm)
 4th Parylene Deposition and Patterning (4μm)

FIG. 3D



DRIE Open Backside Inlet and Outlet
 Acetone Release Sacrificial Photoresist

 1st Cr/Au
  2nd Cr/Au
  Oxide
  Photoresist
  Parylene

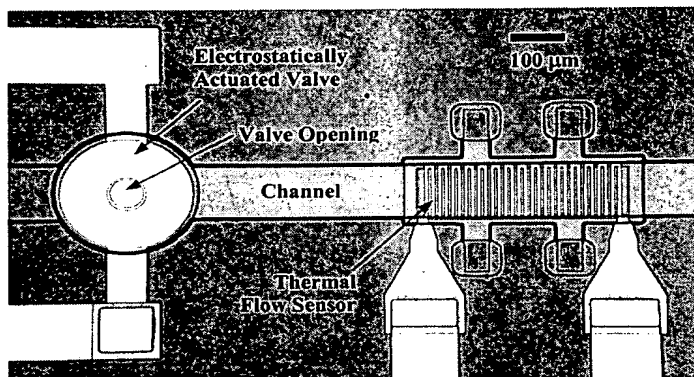


Figure 4. Fabricated Devices

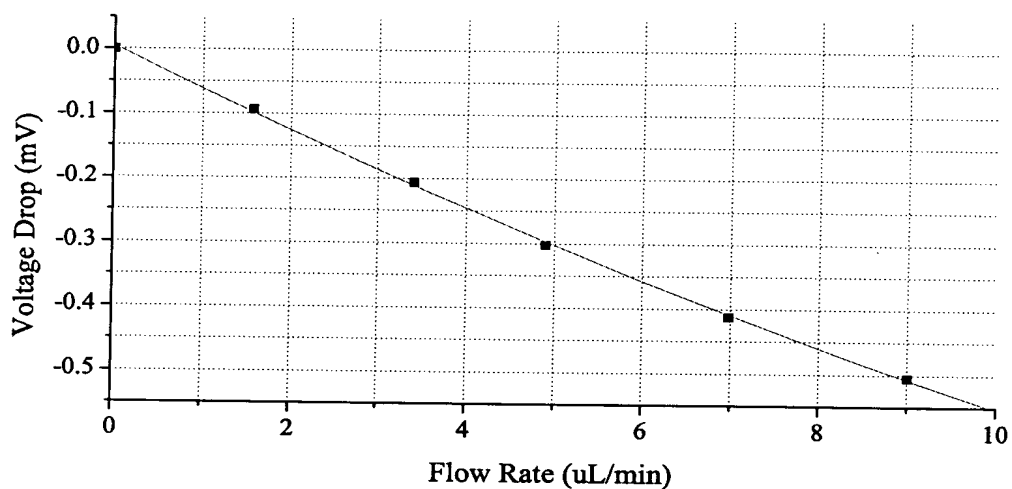


Figure 5. Flow sensor characteristic for air flow.

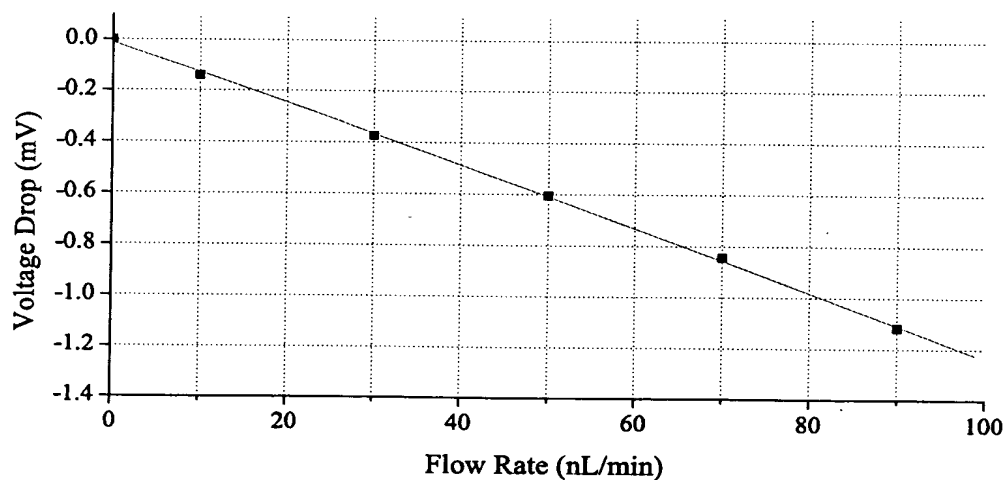


Figure 6. Flow sensor characteristic for water.

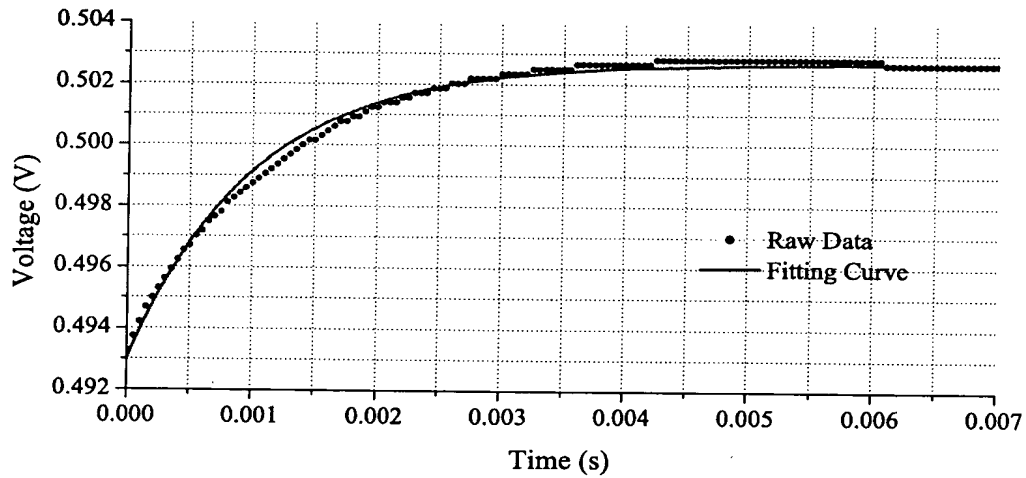


Figure 7. Flow sensor thermal time constant measurement

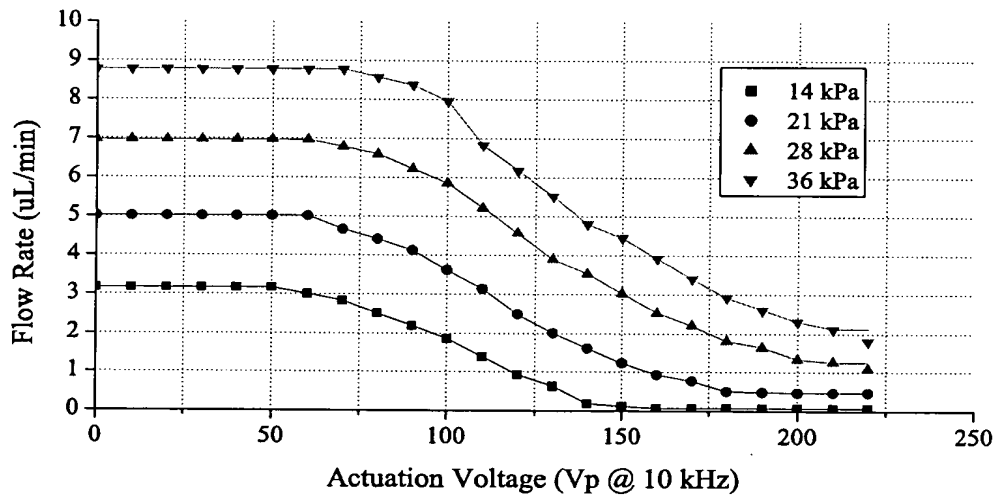
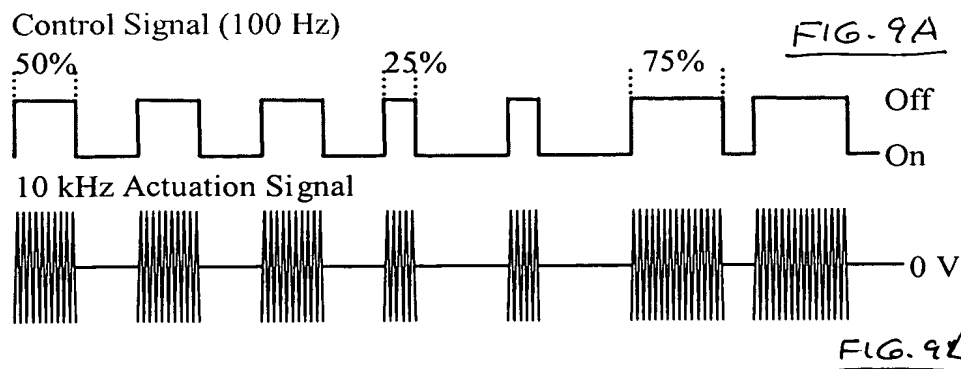


Figure 8. Flow rate vs. actuation voltage.



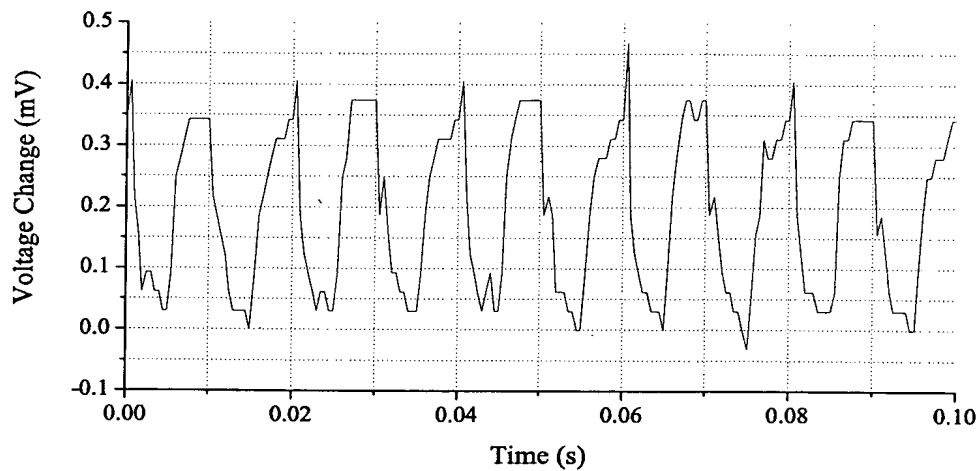


Figure 10. Flow sensor output when the valve is switched by 100 Hz control signal.

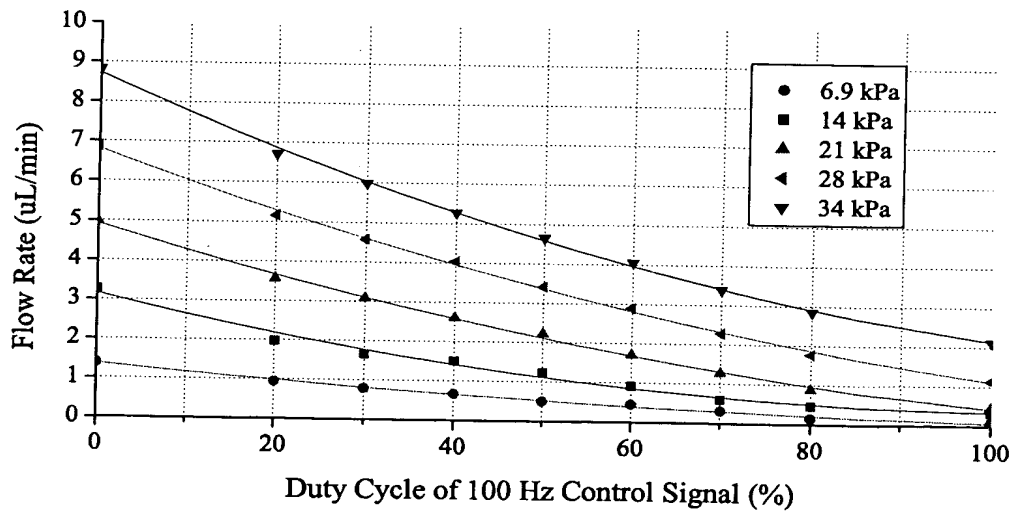


Figure 11. Flow control in PWM mode.